

# Claims

- [c1] 1. A method of fabricating a shallow trench isolation structure for reducing wafer scratchreducing wafer scratch, comprising the steps of:  
providing a substrate; and  
performing a processing operation over a surface of the substrate prior to performing a chemical mechanical polishing process, wherein at least a protrusion is formed over the surface of the substrate during the processing operation, and wherein a parameter of the processing operation is adjusted in a manner to reducing a step height of the protrusion compared that without adjusting the parameter of the processing operation.
- [c2] 2. The method of reducing wafer scratch of claim 1, wherein the processing operation comprises a laser marking process.
- [c3] 3. The method of reducing wafer scratch of claim 2, wherein the step of adjusting a parameter of a processing operation comprises adjusting an energy of the laser beam used in the laser marking process.
- [c4] 4. The method of reducing wafer scratch of claim 3,

wherein the energy of the laser beam used in the laser marking process is smaller than 1000 micro-joule ( $\mu$  j).

[c5] 5. The method of reducing wafer scratch of claim 3, wherein the step of adjusting parameter of the processing operation comprises reducing the step height to a level below 4 micrometer ( $\mu$  m).

[c6] 6. A method of fabricating a shallow trench isolation structure for reducing wafer scratch process of fabricating a shallow trench isolation structure, comprising the steps of:  
providing a substrate;  
performing a laser marking operation to form a laser mark on the substrate, wherein at least a protrusion is formed during the laser marking operation due to an amassment of material, and wherein a parameter of the laser marking operation is adjusted in a manner to reduce a step height of the protrusion compared to that without adjusting the parameter;  
forming a patterned mask layer over the substrate;  
etching the substrate using the patterned mask layer as an etching mask to form a trench;  
forming an insulation layer over the substrate, wherein the insulation layer completely fills the trench;  
removing a portion of the insulation layer by performing a chemical-mechanical polishing process; and

removing the patterned mask layer.

- [c7] 7. The methodprocess of claim 6, wherein step of controlling the parameter of the laser marking operation includes adjusting an energy of the laser beam used in the laser marking operation to a level below 1000 micro-joule ( $\mu$  j).
- [c8] 8. The methodprocess of claim 6, wherein the step of controlling the parameter in the laser marking operation comprises reducing the step height to a level below 4 micrometer ( $\mu$  m).